

## Hydrocarbons

### Long Answer Questions

**Q.1** What are hydrocarbons? Give their different classes depending upon their structure.

**Ans. Hydrocarbons**

Hydrocarbons are those compounds which are made up of only carbon and hydrogen elements.

Hydrocarbons are regarded as the parent organic compounds since other organic compounds are considered to be derived from them by replacement of one or more hydrogen atoms by other atoms or group of atoms.

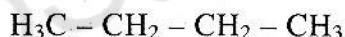
#### Classification of Hydrocarbons

On the basis of structure, hydrocarbons are divided into two main classes:

##### (i) Open chain or Aliphatic hydrocarbons

These are compounds in which the first and the last carbon are not directly joined to each other. The open chains of carbon may be straight or branched.

**Examples;**



Straight chain (n-butane)



Branched chain (isobutane)

#### Types of open chain hydrocarbons

Open chain hydrocarbons have been further subdivided into saturated and unsaturated hydrocarbons.

##### (a) Saturated hydrocarbons

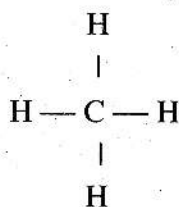
The compounds in which all the four valencies of carbon atoms are fully satisfied (saturated) by single bonds with other carbon atoms and hydrogen atoms are called saturated hydrocarbons. Saturated hydrocarbons are also called alkanes.

Thus, an alkane is a hydrocarbon in which the carbon atoms are connected by only single covalent bond (There are no double or triple covalent bonds in alkanes).

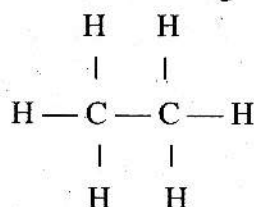
**Examples:**

Methane ( $\text{CH}_4$ ), ethane ( $\text{C}_2\text{H}_6$ ), propane ( $\text{C}_3\text{H}_8$ ) and butane ( $\text{C}_4\text{H}_{10}$ ) are all saturated

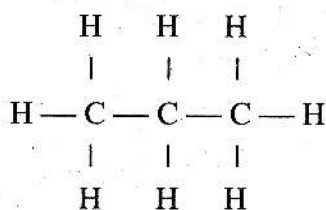
hydrocarbons because they contain only carbon-carbon single bonds, as shown below:



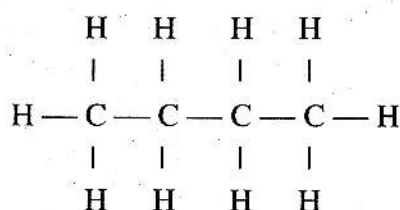
Methane



Ethane



Propane



Butane

### General Formula of Alkanes;

The general formula of alkanes is  $\text{C}_n\text{H}_{2n+2}$ , where  $n$  is the number of carbon atoms in one molecule of the alkane.

### (b) Unsaturated hydrocarbons:

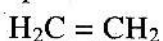
The hydrocarbons in which two carbon atoms are linked by a double or a triple bond are called unsaturated hydrocarbons.

#### Alkenes;

The compounds in which two carbon atoms are linked by a double bond are called alkenes.

#### Examples;

Ethene and propene.



Ethene



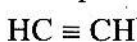
Propene

### General Formula;

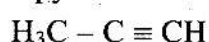
These compounds have general formula  $\text{C}_n\text{H}_{2n}$  and functional group  $\text{>C=C<}$

#### Alkynes;

The hydrocarbons in which two carbon atoms are linked by a triple bond are called alkynes. For example, ethyne and propyne.



Ethyne



Propyne

### General Formula;

They have general formula  $\text{C}_n\text{H}_{2n-2}$  and functional group  $\text{—C}\equiv\text{C—}$

(ii) **Closed chain or Cyclic hydrocarbons:** Compounds having closed chain or rings of carbon atoms in their molecules are called closed chain or cyclic hydrocarbons,

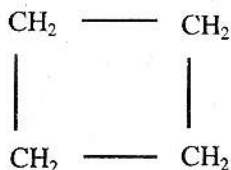
**Examples;**

Benzene ( $C_6H_6$ ), cyclobutane and cyclohexane.

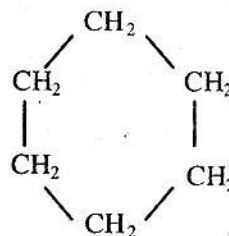
**Structures;**



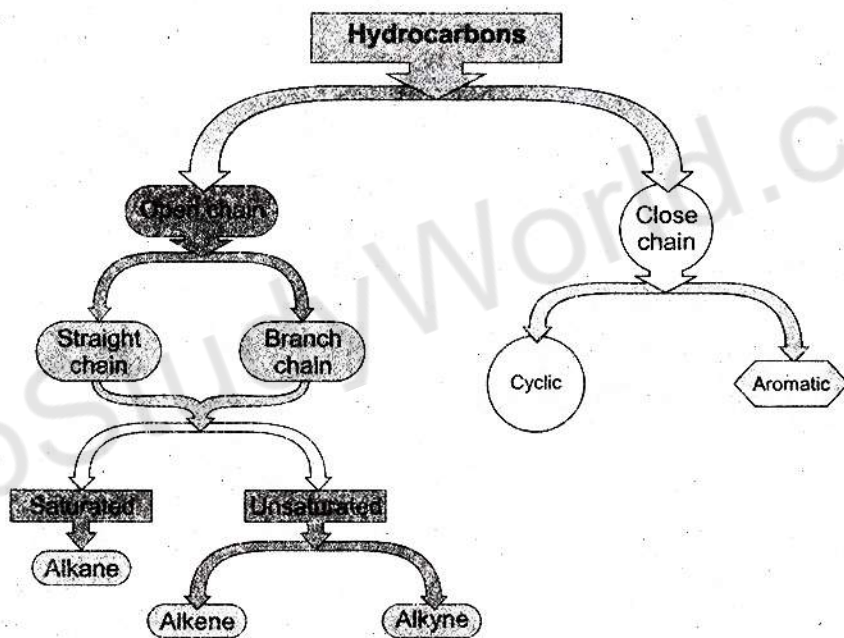
Benzene



Cyclobutane



Cyclohexane

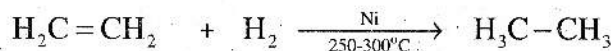


## Q.2 Write the preparation of Alkanes

**Ans.** Alkanes form a series of homologous compounds. So, their methods of preparation and chemical properties are similar. Although, there are many methods of preparation, but only two methods are discussed here.

### (i) Hydrogenation of alkenes and alkynes

Hydrogenation means addition of hydrogen in alkenes and alkynes. As we know alkenes and alkynes are unsaturated compound, so they have the capacity to add up atoms in them. This reaction is carried out in the presence of nickel catalyst at  $250^{\circ}\text{C}$  to  $300^{\circ}\text{C}$ . However, in the presence of catalyst platinum or palladium, the reaction takes place at room temperature, such as:

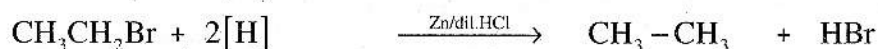


Similarly,



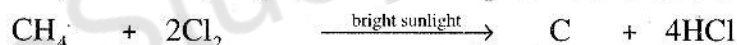
## (ii) Reduction of alkyl halides

Reduction means addition of nascent hydrogen. In fact, it is a replacement of a halogen atom with a hydrogen atom. This reaction takes place in the presence of Zn metal and HCl.



## Q.3 What type of reactions are given by alkanes? Explain with reference to halogenations of alkanes.

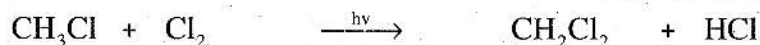
**Ans.** Alkanes give only substitution reaction. A reaction in which one or more hydrogen atoms of a saturated compound are replaced with some other atoms (like halogen) is called a substitution reaction. These reactions are a characteristic property of alkanes. Alkanes react fairly with halogens in diffused sunlight only. In dark there is no reaction. In direct sunlight reaction is explosive and carbon is deposited.



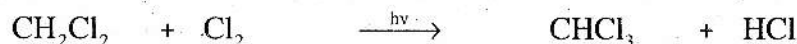
In diffused sunlight a series of reactions take place and at each step one hydrogen atom is substituted by halogen atoms so that all the hydrogen atoms are substituted one by one by halogen atoms.



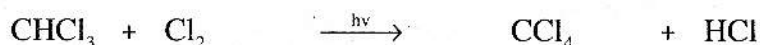
Chloromethane



Dichloromethane



Trichloromethane  
(Chloroform)

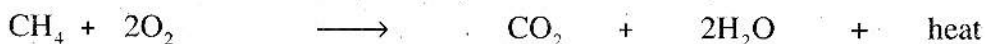


Tetrachloromethane  
(Carbon Tetrachloride)



#### Q.4 Alkanes are a source of heat. Explain it.

**Ans.** Alkanes burn in the presence of excess of air or oxygen to produce a lot of heat, carbon dioxide and water. This reaction takes place in automobile combustion engines, domestic heaters and cooking appliances. It is highly exothermic reaction and because of it alkanes are used as fuel.



In the limited supply of oxygen, there is incomplete combustion. As a result carbon monoxide is produced that creates suffocation and causes death.

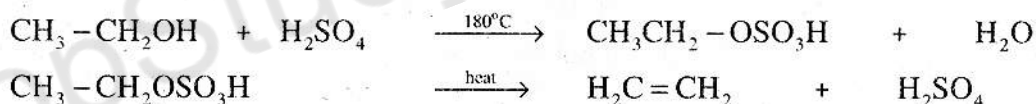


#### Q.5 Write the preparation of alkenes

**Ans.** Alkenes are prepared by the removal of small atoms (H, OH, X) from the adjacent carbon atoms of the saturated compounds, so as to create a double bond between carbon atoms.

##### Dehydration of alcohol

Dehydration is removal of water. Ethene is prepared by heating a mixture of ethanol and excess of concentrated sulphuric acid at  $180^\circ\text{C}$ . In first step, ethyl hydrogen sulphate is formed which decomposes on heating to produce ethene, which is collected over water.



##### Dehydrohalogenation of alkyl halides

On heating ethyl bromide with alcoholic KOH, ethene is formed. Removal of hydrogen and halogen takes place from adjacent carbon atoms to create a double bond.



#### Q.6 Write the Chemical reaction of Alkenes.

##### Ans. Chemical properties of alkenes

Alkenes are reactive compounds because the electrons of the double bond are easily available for reaction. These compounds have the tendency to react readily by adding other atoms, to become saturated compounds. As a result, the double bond is converted into a single bond that is more stable.

##### Addition Reactions of Alkene

Thus, addition reactions are characteristic property of unsaturated compounds. These are the reactions in which the products are formed by the addition of some reagents like

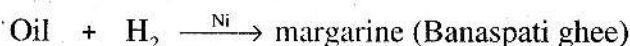
H<sub>2</sub>, Cl<sub>2</sub>, etc., to an unsaturated organic compound. In the process, one of the bonds of a double bond gets broken and two new single bonds are formed.

### (i) Hydrogenation

Hydrogenation means addition of molecular hydrogen to an unsaturated hydrocarbon in the presence of a catalyst (Ni, Pt) to form saturated compound.



On industrial scale, this reaction is used to convert vegetable oil into margarine (Banaspatti ghee).



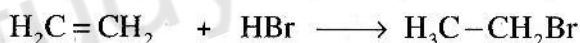
### Halogenations of alkenes

Halogenation means addition of halogen like chlorine or bromine. This reaction is used to identify the unsaturation of an organic compound.



### Hydrohalogenation of alkenes

Dry gaseous hydrogen halides (HI, HBr and HCl) react with alkenes to produce alkyl halides.



The order of reactivity of hydrogen halides is HI > HBr > HCl.

### Oxidation of alkenes with KMnO<sub>4</sub>

Alkenes decolourise the pink colour of acidified dilute solution of potassium permanganate because the double bond electrons react with MnO<sub>4</sub><sup>-</sup> ion, which further goes on to form MnO<sub>2</sub> and ethene glycol (1,2 ethanediol). Such as, there is addition of two 'hydroxyl group' at the double bond.



### Q.7 Write the uses of ethene (Ethylene)

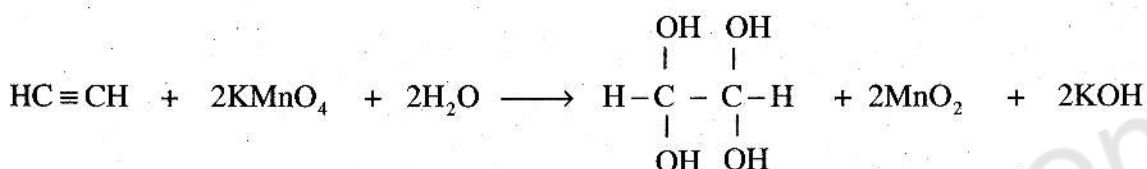
Ans. Ethene is used:

- for artificial ripening of fruits;
- as a general anaesthetic;
- for manufacture of polythene. Polythene is a plastic material used in packaging, toys, bags, etc;

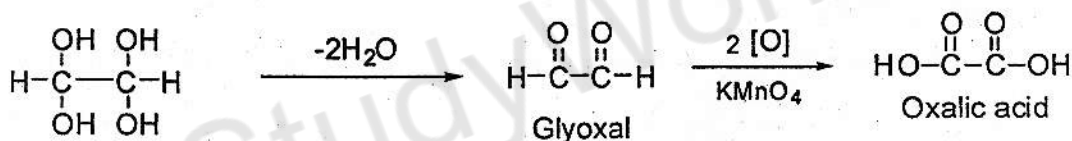
- (iv) as a starting material for the manufacture of a large number of compounds such as ethylene oxide, ethyl alcohol, ethylene glycol, diethyl ether, etc.; ethylene oxide is used as a fumigant, ethylene glycol is used as an antifreeze, diethyl ether and ethyl alcohol are used as solvents and
- (v) for making poisonous mustard gas which is used in chemical warfare.

### Q.8 Explain the oxidation of acetylene.

**Ans.** Acetylene is oxidized by alkaline  $\text{KMnO}_4$  and four hydroxyl groups add to the triple bond, such as;



This intermediate product eliminates water molecules to form glyoxal, which is further oxidized to form oxalic acid.



### Q.9 Write the uses of acetylene.

**Ans.**

- (i) Acetylene produces oxy-acetylene flame with oxygen. It is a highly exothermic reaction. Heat released is used for welding purposes.
- (ii) Acetylene is used to prepare other chemicals, such as; alcohols, acetaldehyde and acids.
- (iii) It is used for the ripening of fruits.
- (iv) It is used for the manufacturing of polymer products like polyvinyl chloride, polyvinyl acetate and synthetic rubber like neoprene.
- (v) It is polymerized to form benzene, which is used as raw material to form a variety of organic compounds.

### Q.10 Briefly describe the preparation of alkynes.

**Ans. Preparation of alkynes**

Alkynes are important hydrocarbons which have triple bond among their carbon atoms, alkynes are prepared by the following methods.



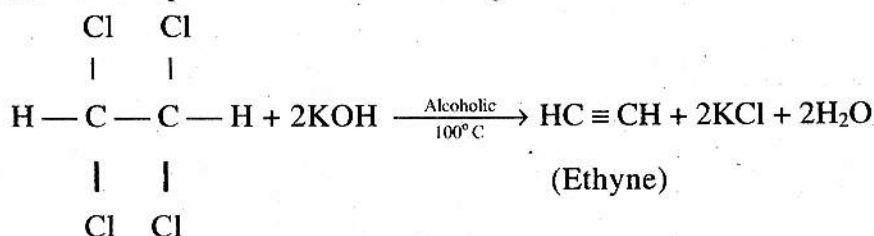
## 1. Dehydrohalogenation of Vicinal Dihalides:

### Dehydrohalogenation:

The process of removal of hydrogen and halogen from a compound is known as dehydrohalogenation.

### Procedure;

When a vicinal dihalide is heated with alcoholic KOH, two hydrogen atoms along with two halogen atoms are removed from two adjacent carbon atoms with the formation of a triple bond between the adjacent carbons.



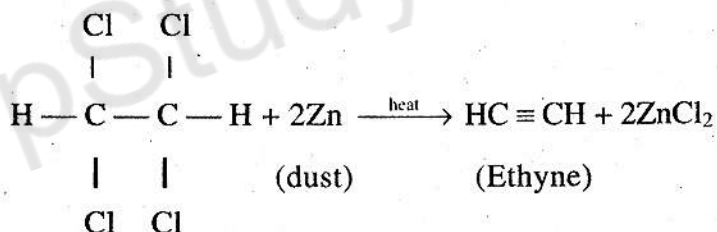
## 2. Dehalogenation of Tetrahalides;

### Dehalogenation:

The removal of halogen from adjacent carbon atoms is called as dehalogenation.

### Procedure:

When alkyl tetrahalides are heated with zinc dust, the elimination of halides takes place to form ethyne.



## Q.11 Write the Chemical Properties of Alkynes:

### Ans. Chemical Properties of Alkynes

Alkynes are reactive compounds because of presence of a triple bond. A triple bond consist of two weak bonds and a strong bond. When alkynes react with other substance, two weak bonds are readily broken one by one and addition takes place easily. The addition reactions of alkynes resemble to those of alkenes.

Following are the important chemical reactions of alkynes:

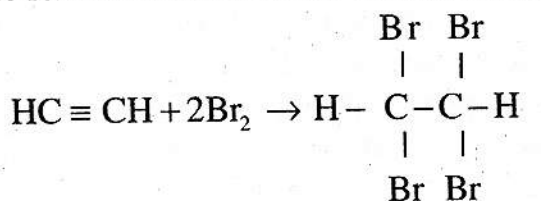
### 1. Addition of Halogen:

Chlorine and bromine adds to acetylene to form tetrachloroethane and tetrabromoethane, respectively.



### Procedure

When bromine water is added to acetylene, red brown colour of bromine water is discharged rapidly due to formation of colourless tetrabromoethane.



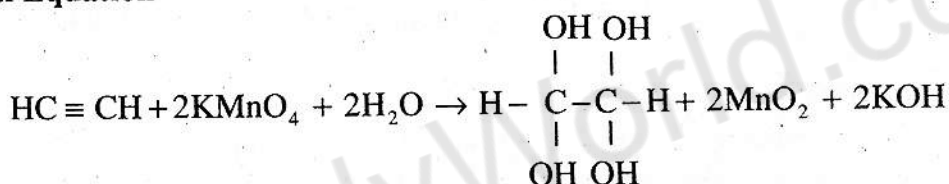
(Tetrabromoethane)

This reaction is used to identify the unsaturation of alkynes.

### 2. Oxidation with $\text{KMnO}_4$ :

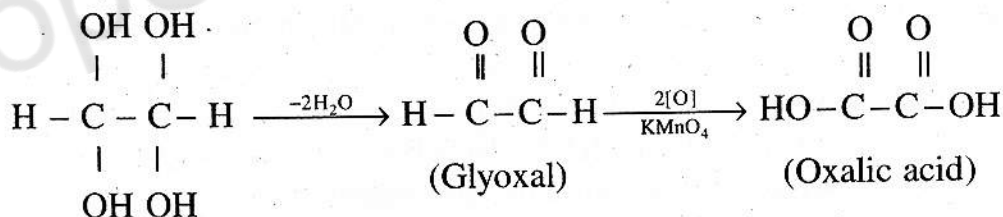
Ethyne is oxidized by alkaline  $\text{KMnO}_4$  and four hydroxyl groups add to the triple bond, such as;

#### Chemical Equation



This intermediate product eliminates water molecules to form glyoxal, which is further oxidized to form oxalic acid.

#### Chemical Equation:



**Q.12 Write a detail note on hydrocarbons as feed stock in industry.**

**Ans. Hydrocarbons as Feed Stock in Industry:**

Hydrocarbons are not only used as fuel in auto-mobiles or industries, they are also used as raw material in industry. It is explained as:

#### i. Petrochemical Industry:

The organic compounds prepared from hydrocarbons (petroleum and natural gas) are called petrochemicals. Some of the important petrochemicals are methyl alcohol, ethyl alcohol, chloroform, formic acid, carbon tetrachloride, ethylene butadiene, benzene, toluene etc.

## ii. Plastic Industry:

Hydrocarbons are used as raw materials for the preparation of a large variety of items used in daily life. Such as synthetic polymers, called plastics like polythene, polyester. So plastics are synthetic materials which can be given any shape when soft and on hardening make a durable article to be used in common life. For example, crockery items (cups, glass, jug, plates, spoons) furniture items (Chair, table, stool) auto-mobile parts, electric and sewage items and a lot of other house hold items.

## iii. Rubber Industry:

Hydrocarbons are used to prepare synthetic rubber. Such as, acetylene is used to prepare butadiene rubber used for making foot wear, tyres and toys. Similarly a good quality rubber neoprene is prepared from chloroprene.

## iv. Synthetic Fiber Industry:

Hydrocarbons are used to prepare synthetic fibers like nylon, rayon, polyesters. These fibers have better qualities like greater strength, good elasticity, resistance to wear and tear. So clothes made of synthetic fibers are long lasting than that of natural fibers.

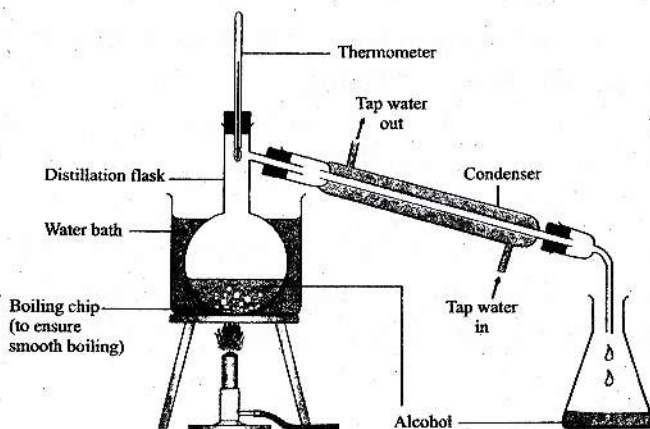
## v. Synthetic Detergents:

Long chain hydrocarbons obtained from petroleum and used to make synthetic detergents and washing powders. These detergents have long chain of alkyl hydrogen sulphate. These detergents have better and stronger cleaning properties than that of soaps. They can be used even in hard water.

**Q.13 Describe an experiment by which you can determine the boiling point of alcohol.**

**Ans. Point of Alcohol:**

The boiling point of an alcohol (ethyl alcohol) at normal atmospheric pressure can be determined by using a set-up as shown in figure below:



When alcohol is heated, temperature rises up until it reaches upto  $78^{\circ}\text{C}$ . From there onward, even the heating process goes on but the temperature remains constant. This is the boiling point of alcohol. It is to be noted that temperatures does not change during the boiling process.

### Short Answer Question

**Q.1 Differentiate between saturated and unsaturated hydrocarbons.**

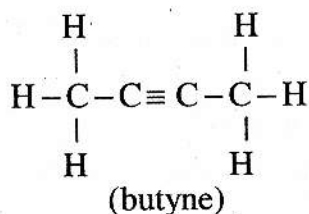
**Ans.**

Saturated Hydrocarbons	Unsaturated Hydrocarbons
The hydrocarbons in which all the four valencies of carbon atoms are fully satisfied (saturated) by single bond with other carbon atoms and hydrogen atoms are called saturated hydrocarbons	The hydrocarbons in which two carbon atoms are linked by a double or a triple bond are called unsaturated hydrocarbons.
They are also called alkanes	They are also called alkenes and alkynes.
The general formula of saturated hydrocarbon is $\text{C}_n\text{H}_{2n+2}$	The general formula of alkenes is $\text{C}_n\text{H}_{2n}$ and alkynes is $\text{C}_n\text{H}_{2n-2}$
Examples $\text{CH}_4$ , $\text{C}_2\text{H}_6$ , $\text{C}_3\text{H}_8$	Examples $\text{C}_2\text{H}_4$ , $\text{C}_2\text{H}_2$

**Q.2 A compound consisting of four carbon atoms has a triple bond in it. How many hydrogen atoms are present it?**

**Ans.** There is six hydrogen atoms is presented in a compound containing the four carbon atoms has a triple bond in it.

**Example**



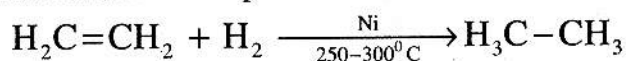
**Q.3 Why the alkanes are called paraffin?**

**Ans.** Alkanes are saturated hydrocarbons. In these compounds all the bonds of carbon atoms are single that mean valencies of carbon atoms are fully satisfied (saturated) therefore they are least reactive. That is the reason alkanes are called paraffin's.



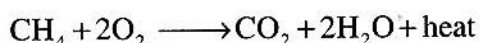
#### Q.4 What do you know about hydrogenation of alkenes?

**Ans.** Hydrogenation means addition to an unsaturated hydrocarbon in presence of a catalyst (Ni, Pt) to form saturated compound.



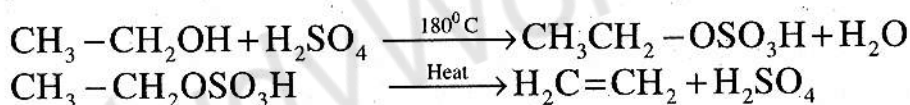
#### Q.5 Why the alkanes are used as fuel?

**Ans.** Alkanes burn in the presence of excess of air or oxygen to produce a lot of heat, carbon dioxide and water. This reaction is take place in automobile, combustion engines, domestic heaters and cooking appliances. It is highly exothermic reaction and because of its alkanes are used as fuel.



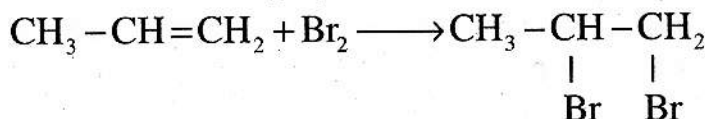
#### Q.6 How can you prepare ethene from alcohol.

**Ans.** Ethene is prepared by heating a mixture of ethanol and excess of cone sulphuric acid at  $180^\circ\text{C}$  in first step ethyl hydrogen sulphate is formed which decomposes on heating to produce ethane which is collected over water.



#### Q7. Indentify propene from propane with a chemical test.

**Ans.** Pass the two gases through bromine water separately. Propene will decolourise reddish brown colour of bromine but propane cannot. Reaction is



reddish-brown in colour

Colourless

#### Q.8 Why alkenes are called olefins?

**Ans.** alkenes are called olefins. Because first members of alkenes form oily products when react with halogens.

#### Q.9 Why alkane can't be oxidized with $\text{KMnO}_4$ solution?

**Ans.** Alkanes are saturated hydrocarbons. They are least reactive at high temperatures that are why alkenes can't be oxidized with  $\text{KMnO}_4$  solution.

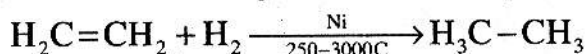


**Q.10 What are addition reactions? Explain with an example**

**Ans.** Addition of substance to an unsaturated hydrocarbon is called addition reaction.

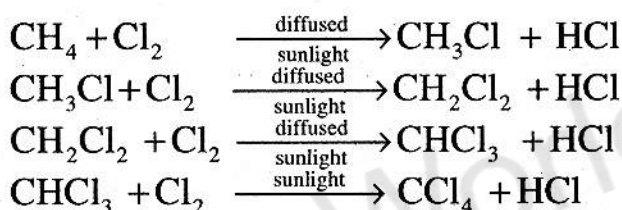
**Example:**

Addition of hydrogen to an unsaturated hydrocarbon in the presence of catalyst (Ni, Pt).



**Q.11 Justify that alkanes give substitution reactions.**

**Ans.** A reaction in which one or hydrogen atoms of a saturated compound are replaced with some other atoms is called a substitution reaction these reactions are characteristic property of alkanes. For example in diffused sunlight alkanes react fairly with halogens. In these reactions at each step one hydrogen atom is substituted by halogen atom.



**Q.12 Both alkenes and alkynes are unsaturated hydrocarbons. State the one most significant difference between them.**

**Ans.** Alkynes have greater carbon to hydrogen ratio. So they give smokier flames but alkanes and alkenes do not.

**Q.13 Write the molecular, dot and cross and structural formula of ethyne**

**Ans.** (i) Molecular formula of ethynes  $\text{C}_2\text{H}_2$   
 (ii) Structural formula  $\text{H}-\text{C}\equiv\text{C}-\text{H}$   
 (iii) Cross and dot formula  $\text{H}\times\bullet\text{C}\begin{smallmatrix}\times\bullet\\\bullet\bullet\\\times\bullet\end{smallmatrix}\text{C}\bullet\times\text{H}$

**Q.14 Why hydrocarbons are soluble in organic solvents?**

**Ans.** Hydrocarbons are soluble in organic solvents because they are non polar.

**Q.15 Give the physical properties of alkanes.**

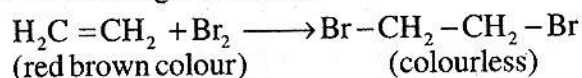
**Ans.**

- (i) Alkanes are non-polar, therefore they insoluble in water but soluble in organic solvents
- (ii) The density of alkanes increases gradually with the increases of molecular size.
- (iii) The alkanes become more viscous as their molecular size increase

(iv) Alkanes become less flammable i.e. difficult to burn with the increase of molecular sizes.

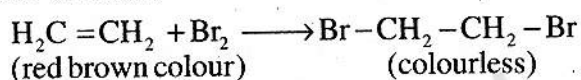
**Q.16 How can you identify ethane from ethene?**

**Ans.** When bromine water is added to ethane in an inert solvent like carbon tetrachloride, its colour is discharged at once.



**Q.17 Why colour of bromine water discharges on addition of ether in it?**

**Ans.** Because in the reaction double bond of ethane is converted into single bond by addition of a molecule of bromine



**Q.18 State one important use of each:**

(i) Ethene (ii) Acetylene (iii) Chloroform (iv) Carbon tetrachloride

**Ans.**

**(i) Ethene**

It is used for manufacturing of polythene.

**(ii) Acetylene**

It is used to prepare alcohols acetaldehyde and acids

**(iii) Chloroform**

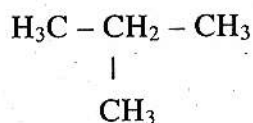
It is used as a solvent for rubber, waxes and used for anaesthesia.

**(iv) Carbon tetrachloride**

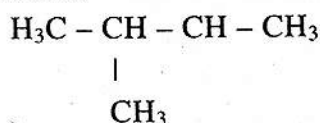
It is used an industrial solvent and in dry cleaning

**Q.19 Give the structural formula of isobutane and isopentane.**

**Ans.** (a) Isobutene



**(b) Isopentane**



**Q.20 Why hydrocarbons are considered as parent organic compounds?**

**Ans.** Because mostly organic compounds are derived from hydrocarbons by the replacement of one or more hydrogen atoms by other atoms or group of atoms that why hydrocarbons are considered as a parent organic compounds.

**Q.21 What is the difference between a straight and a branched chain hydrocarbons**

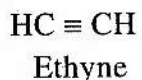
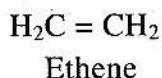
**Ans.**

Straight Chain Hydrocarbons	Branched Chain Hydrocarbons
Straight chain hydrocarbons straight chain compound are these in which carbon atoms link with each other through a single, double or triple bond forming a straight chain.	Branched chain compounds are these in which there is a branch along a straight chain
Example: $\text{H}_3\text{C} - \text{CH}_2 - \text{CH}_2 - \text{CH}_3$ n-butane	Example: $\begin{array}{c} \text{H}_3\text{C} - \text{CH}_2 - \text{CH}_3 \\   \\ \text{CH}_3 \end{array}$ Isobutane

**Q.22 Define unsaturated hydrocarbons? Give example.**

**Ans.** The hydrocarbons in which two carbon atoms are linked by a double or a triple bond are called unsaturated hydrocarbons

**Example:**



**Q.23 What do you mean by halogenations? Give the reaction of methane with chlorine in bright sunlight.**

**Ans.** Halogenation means addition of halogen like chlorine or bromine to unsaturated hydrocarbons. In bright sunlight, the reaction of with chlorine is explosive and carbon is deposited.



**Q24. Why alkenes are reactive?**

**Ans.** Alkenes are very reactive compounds because the electrons of the double bond are easily available for reaction. The compounds have tendency to react readily by adding other atoms to become saturated compounds.



## Unique Notes Chemistry 10<sup>th</sup>

(iv) Alkanes become less flammable as their chain lengths increase.

**Q.16 How can you identify alkanes from hydrocarbons by the flame test?**

**Ans.** When bromine water is added to a hydrocarbon, its colour changes from brown to colourless.



...member of series

**Q.17 Why colour of bromine water changes when added to a hydrocarbon?**

**Ans.** Because in the presence of a hydrocarbon, the brown colour of bromine water is decolourised.

...brown colour of bromine water is decolourised.

**Q.18 State the following:**

(i) Ether

**Ans.**

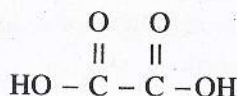
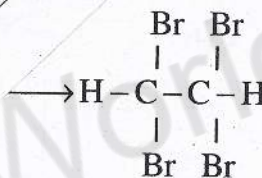
(i) Ether

It is

(ii) Acid

It is

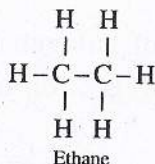
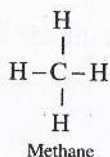
(iii) Alkyne



**Alkanes. Give its general formula?**

Alkanes are hydrocarbons in which the carbon atoms are connected by only single bonds.

Examples:



The general formula of alkanes is  $\text{C}_n\text{H}_{2n+2}$

**Q.30 What are hydrocarbons?**

**Ans.** Hydrocarbons are organic compounds of carbon and hydrogen elements. They are alkanes, alkenes and alkynes.



**Q.31 What are aliphatic hydrocarbons?**

**Ans.** These are the compounds in which the first and the last carbon are not directly joined to each other. These are may be straight or branched.

**Examples:**  $\text{H}_3\text{C} - \text{CH}_2 - \text{CH}_2 - \text{CH}_3$   
(n - butane)

$\text{H}_3\text{C} - \text{CH}_2 - \text{CH}_3$   
|  
 $\text{CH}_3$  (isobutane)

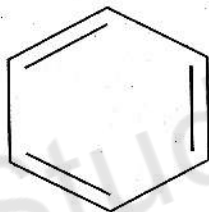
**Q.32 Give a few uses of methane?**

- Ans.** i. Natural gas is chiefly methane is used as domestic fuel.  
ii. Compressed natural gas (CNG) is used as automobile fuel.

**Q.33 What are Cyclic hydrocarbons?**

**Ans.** Compounds having ring of carbon atoms in their molecule are called closed chain or cyclic hydrocarbons.

**Examples:**



(Benzene)



(Cyclo butane)

**Q.34 What are alkenes? Give its general formula?**

**Ans.** Alkenes are unsaturated hydrocarbons having double bond between two carbon atoms the

**General formula:**

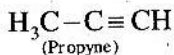
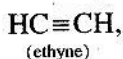


**Example:**  $\text{H}_2\text{C} = \text{CH}_2$  (Ethene)

**Q.35 What are alkynes? Give its general formula?**

**Ans.** The hydrocarbon in which two carbon atoms are linked by a triple bond are called alkynes.

**Example:**



**Q.36 Write the sources of alkanes?**

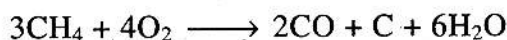
**Ans.**

- i) The main sources of alkanes are petroleum and natural gas.
- ii) Methane forms about 85% of Natural gas.
- iii) Fuel gases obtained from coal gas contain alkanes in small amount.

**Q.37 Why the burning of alkanes require sufficient supply of oxygen?**

**Ans.** Because in the limited supply of oxygen there is incomplete combustion. As a result carbon monoxide is produced that creates suffocation and causes death. As shown in chemical reaction equation.

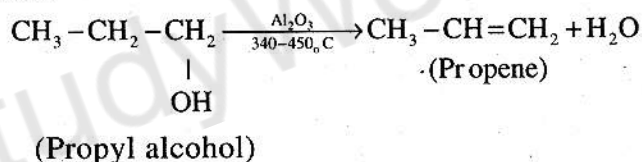
**Chemical Equation:**



**Q.38 How can you prepare propene from propyl alcohol?**

**Ans. Dehydration of Alcohols:** Alcohols when dehydrated in the presence of a catalyst give alkene. The best procedure is to pass vapours of alcohol over heated alumina.

**Chemical Equation:**

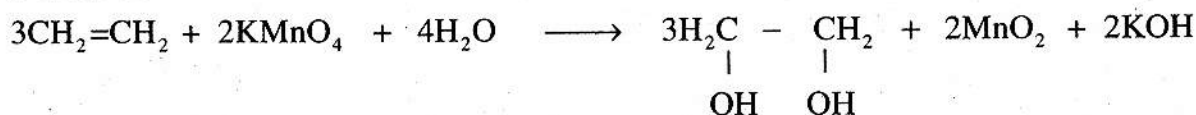


**Q.39 Give a test to identify unsaturation of an organic compound.**

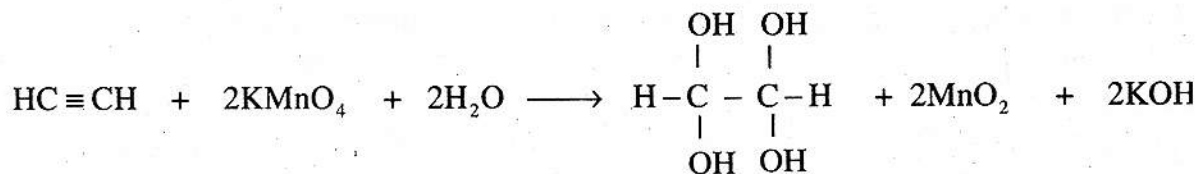
**Ans. Oxidation with  $\text{KMnO}_4$ :** When unsaturated compounds oxidized with  $\text{KMnO}_4$  the pink colour discharged.

**For Example:**

**i. Reaction with Alkene:**



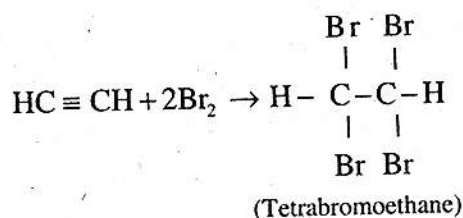
**ii. Reaction with Alkyne:**



**Q. 40 How is tetrabromoethane prepared from acetylene.**

**Ans. Preparation of Tetrabromoethane from Acetylene:** Tetrabromoethane can be prepared by the addition of halogens to the acetylenes what bromine water added to acetylene, red brown colour of bromine water is discharged rapidly due to formation of colourless tetrabromoethane.

**Chemical Equation:**



**Q.41. What is difference between glycol and glyoxal?**

Ans.	Glycol	Glyoxal
	1. The functional group in glycol is "hydroxyl group"	1. The functional group in glyoxal is $\begin{array}{c} \text{O} \\    \\ -\text{C}- \end{array}$ group.
	2. The formula of a glycol is $\begin{array}{cc} \text{H}_2\text{C} & - & \text{CH}_2 \\   & &   \\ \text{OH} & & \text{OH} \end{array}$	2. The formula of a glyoxal is $\begin{array}{cc} \text{O} & \text{O} \\    &    \\ \text{H}-\text{C} & - & \text{C}-\text{H} \end{array}$

**Q.42 Why methane is known as marsh gas?**

**Ans.** Methane as a Marsh Gas: Poke around with a stick in the muddy bottom of a pond or marsh. You may see bubbles coming out of the mud. These bubbles are the hydrocarbon gas methane, which is sometimes called 'marsh gas. If you collect the gas in a jam jar you can set fire to it.

**Q.43 Which chemicals were produced by orchids to attract the insects for their pollination?**

**Ans.** Orchids: Orchids are beautiful ornamental and colourful flowers. Some orchids produce alkanes to attract bees to pollinate their flowers.

**Q.44 Why butane is used in portable torches and gas lighters?**

**Ans.** Propane and butane burn with very hot flames and are sold as liquefied petroleum gas (LPG). They are kept as liquids under pressure, but they vapourize easily when the

pressure is released. Cylinders of butane are used in the homes. Butane is also used in portable torches and gas lighters.

**Q.45 Give few physical properties of alkenes.**

**Ans.**

- (i) The first member of alkenes is ethane. It is a colourless gas with pleasant odour.
- (ii) Alkenes are non-polar therefore; they are insoluble in water but soluble in organic solvent.
- (iii) The first member of the series ethane is slightly less dense than air.

### Multiple Choice Questions

**1. Which one of these hydrocarbon molecules would have no effect on an aqueous solution of bromine?**

- (a)  $\text{CH}_4$
- (b)  $\text{C}_{10}\text{H}_{20}$
- (c)  $\text{C}_2\text{H}_4$
- (d)  $\text{C}_2\text{H}_2$

**2. If an organic compound has 4 carbon atoms, all singly bonded, it will have the following characteristics except one**

- (a) it will be saturated hydrocarbon
- (b) it will have 8 hydrogen atoms
- (c) its name will be n-butane.
- (d) it will be least reactive

**3. The reduction of alkyl halides takes place in the presence of**

- (a)  $\text{Zn}/\text{HCl}$
- (b)  $\text{Na}/\text{HCl}$
- (c)  $\text{Mg}/\text{HCl}$
- (d)  $\text{Cu}/\text{HCl}$

**4. Halogenation of methane produces following valuable chemical compounds used as solvents except:**

- (a) carbontetrachloride
- (b) chloroform
- (c) carbon black
- (d) chloromethane

**5. Incomplete combustion of alkanes produces**

- (a) carbon dioxide only
- (b) carbon monoxide only
- (c) carbon monoxide carbon black and water
- (d) carbon dioxide and carbon black

**6. Alkenes are prepared from alcohols by a process called**

- (a) dehydrogenation
- (b) dehalogenation
- (c) dehydration
- (d) dehydrohalogenation

**7. Dehydrohalogenation takes place in the presence of**

- (a)  $\text{NaOH}$  aqueous
- (b) alcoholic  $\text{KOH}$
- (c) aqueous  $\text{KOH}$
- (d) alcoholic  $\text{NaOH}$

**8. Oxidation of ethene with  $\text{KMnO}_4$  produces**

- (a) oxalic acid
- (b) glyoxal
- (c) ethene alcohol



(d) propene glycol

**9. Which one of these is a saturated hydrocarbon?**

- (a)  $C_2H_4$  (b)  $C_3H_6$   
(c)  $C_4H_8$  (d)  $C_5H_{12}$

**10. A hydrocarbon has molecular formula  $C_8H_{14}$ . What is the molecular formula of the next member of the same homologous series.**

- (a)  $C_9H_{18}$  (b)  $C_9H_{16}$   
(c)  $C_9H_{20}$  (d)  $C_9H_{12}$

**11. The molecular formulae of the first three members of the alkane hydrocarbons are  $CH_4$ ,  $C_2H_6$  and  $C_3H_8$ . What is the molecular formula for the eighth alkane member, octane, which is found in petrol?**

- (a)  $C_8H_8$  (b)  $C_8H_{16}$   
(c)  $C_8H_{18}$  (d)  $C_8H_{20}$

**12. One of the hydrocarbons reacts with one mole of hydrogen to form a saturated hydrocarbon. What formula could be of the X.**

- (a)  $C_3H_8$  (b)  $C_6H_{12}$   
(c)  $C_4H_{10}$  (d)  $C_7H_{16}$

**13. Dehydration of alcohols can be carried out with**

- (a) NaOH (b) KOH  
(c)  $H_2SO_4$  (d) HCl

**14. The end product of oxidation of acetylene is**

- (a) oxalic acid (b) glycol  
(c) glyoxal (d) none

**15. Dehalogenation of tetrahalides produces acetylene. This reaction takes place in the presence of**

- (a) sodium metal

- (b) zinc metal  
(c) magnesium metal  
(d) potassium metal

**16. Substitution reaction is the characteristics of**

- (a) alkanes (b) alkenes  
(c) alkynes (d) none of these

**17. Halogenation of alkanes in the presence of diffused sunlight takes place**

- (a) suddenly, only in one step  
(b) slowly in one step  
(c) in a series of step  
(d) fastly in two steps

**18. Which one of the following is a substitution reaction?**

- (a) halogenations of alkynes  
(b) halogenations of alkenes  
(c) halogenations of alkanes  
(d) bromination of alkene s

**19. The order of reactivity of hydrogen halides with alkenes is**

- (a)  $HI > HBr$   
(b)  $HBr > HI$   
(c)  $HCl > HBr$   
(d)  $HBr < HCl$

**20. Oxidation of alkenes produce**

- (a) glyoxal (b) glycol  
(c) oxalic acid (d) formic acid

**21. Which is the simplest alkane?**

- (a)  $CH_4$  (b)  $C_3H_8$   
(c)  $C_2H_2$  (d)  $C_2H_4$

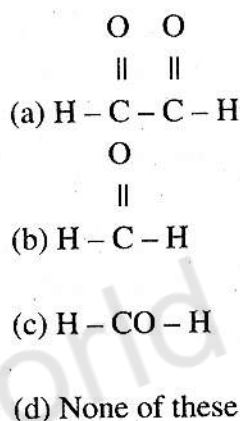
**22. Carbon black is used in the manufacture of**

- (a) dry cleaning (b) shoe polishes  
(c) fertilizers (d) none of these

**23. Alkanes give reaction only**

- (a) addition (b) decomposition  
(c) substitution (d) displacement
- 24. Chemical formula of chloroform is**  
(a)  $\text{CH}_2\text{Cl}_2$  (b)  $\text{CH}_3\text{Cl}$   
(c)  $\text{CHCl}_3$  (d)  $\text{CCl}_4$
- 25. Alkenes are produced in large amounts by cracking of**  
(a) natural gas (b) petroleum  
(c) benzene (d) xylol
- 26. Traces of acetylene are present in coal gas about**  
(a) 0.06% (b) 0.08%  
(c) 1.1% (d) 90%
- 27. Which of the following gas is used in warfare?**  
(a) methane (b) ethane gas  
(c) mustard gas (d) none of these
- 28. Which one of the following is more reactive?**  
(a) methane (b) ethane  
(c) ethene (d) acetylene
- 29. Condensed formula of ethane is**  
(a)  $\text{C}_3\text{H}_8$  (b)  $\text{C}_2\text{H}_6$   
(c)  $\text{H}_3\text{CCH}_3$  (d) none of these
- 30. The general formula of alkynes is**  
(a)  $\text{C}_n\text{H}_{2n}$  (b)  $\text{C}_n\text{H}_{2n+2}$   
(c)  $\text{C}_n\text{H}_{2n-2}$  (d)  $\text{C}_n\text{H}_{2n+1}$
- 31. Alkanes do not react in**  
(a) diffused sunlight (b) bright sunlight  
(c) dark (d) none of these
- 32. Carbon tetra chloride is used in**  
(a) fertilizers (b) dry cleaning  
(c) metallurgy (d) anesthesia
- 33. The alkanes consisting of  $\text{C}_5$  to  $\text{C}_{10}$  are**  
(a) gases (b) liquids  
(c) solids (d) plasma

- 34. Chloroform is used for**  
(a) anesthesia (b) fever  
(c) ink (d) toys
- 35. Molecular formula of butyne is**  
(a)  $\text{C}_4\text{H}_6$  (b)  $\text{C}_3\text{H}_4$   
(c)  $\text{C}_4\text{H}_7$  (d)  $\text{C}_4\text{H}_8$
- 36. Formula of glyoxal is**



- 37. Alkanes are least reactive compounds because they are**  
(a) saturated hydrocarbons  
(b) unsaturated hydrocarbons  
(c) both (a) and (b)  
(d) none of the above
- 38. Which is present 85% in natural gas?**  
(a) Ethane (b) Propane  
(c) Methane (d) Butane
- 39. Hydrogenation of alkenes and alkynes takes place at room temperature in the presence of**  
(a) Ni (b) Pt  
(c) Pd (d) Both a and b
- 40. Which one is the formula of chloromethane**  
(a)  $\text{CH}_2\text{Cl}_2$  (b)  $\text{CCl}_4$

- (c)  $\text{CHCl}_3$  (d)  $\text{CH}_3\text{Cl}$
- 41. Which gas creates suffocation and causes death?**
- (a) CO (b)  $\text{CO}_2$   
(c)  $\text{SO}_3$  (d)  $\text{SO}_2$
- 42. In shoe polishes, which chemical is used**
- (a) ethanol (b) methanol  
(c) carbon black  
(d) formaldehyde
- 43. In dry cleaning, which chemical is used**
- (a) chloroform  
(b) carbon tetrachloride  
(c) acetaldehyde  
(d) ethanol

**44. some orchids attracts bees for pollination by producing**

- (a) alkanes (b) alkenes  
(c) alkynes (d) above all

**45. Dehydration means removal of**

- (a) water (b) halogen  
(c) hydrogen (d) all above

**46. Benzene is formed by the polymerization of**

- (a) alkene (b) alkane  
(c) acetylene (d)  $\text{CH}_4$

**47. Ethylene is present in natural gas sometimes to the extent of**

- (a) 10% (b) 20%  
(c) 30% (d) 40%

### Answer Keys

1.	a	2.	b	3.	a	4.	c	5.	c
6.	c	7.	b	8.	c	9.	d	10.	b
11.	d	12.	d	13.	c	14.	c	15.	b
16.	a	17.	c	18.	c	19.	a	20.	b
21.	a	22.	b	23.	c	24.	c	25.	b
26.	a	27.	c	28.	d	29.	c	30.	c
31.	c	32.	b	33.	b	34.	a	35.	a
36.	a	37.	a	38.	c	39.	d	40.	d
41.	a	42.	c	43.	b	44.	a	45.	a
46.	c	47.	b						